CLAIMS:

1. (Original) A self-moisturizing polymer electrolyte membrane composition for use in a fuel cell, said composition comprising

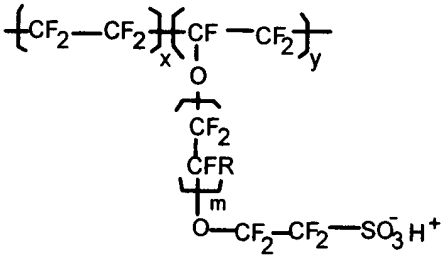
(a) a proton-conducting polymer comprising a detachable hydrogen ion and a counter-ion bonded to said polymer; and

(b) a deliquescent material for keeping said membrane wet and for detaching said hydrogen ion to facilitate proton transport in said membrane.

2. (Original) The membrane as defined in claim 1, wherein said deliquescent material is selected from the group consisting of zinc chloride, calcium chloride, magnesium chloride, lithium chloride, calcium bromide, potassium biphosphate, sodium formate, potassium acetate, phosphorous oxide, ammonium acetate, sodium acetate, sodium silicate, magnesium acetate, potassium silicate, magnesium sulfate, aluminum oxide, calcium oxide, silicon oxide, zeolite, barium oxide, cobalt chloride, bentonite, montmorillonite clay, silica gel, molecular sieve, monohydric compounds, polyhydric compounds, metal nitrate salt, sodium ethyl-sulfate organic salt, polyethylene glycol, polyvinyl pyrrollidone, and combinations thereof.

3. (Original) The membrane as defined in claim 1, wherein said proton-conducting polymer is selected from the group consisting of poly(perfluoro sulfonic acid), its chemical derivative, its copolymer, its blend with a second polymer, and combinations thereof.

4. (Original) The membrane as defined in claim 1, wherein said proton-conducting polymer is selected from the group represented by the formula:



where x and y are integers selected from 1 to 100,000, m is an integer selected from 0 to 10 and R is a functional group selected from the group consisting of H, F, Cl, Br, I, and CH_3.

5. (Cancelled)

6. (Cancelled)

7. (Canceled)

8. (Original) A self-moisturizing fuel cell comprising:

(a) a central polymer electrolyte membrane as defined in claim **1** for proton transport, said membrane comprising two opposite primary surfaces;

(b) two electro-catalyst layers on the two opposite sides of the electrolyte membrane in which the chemical reactions occur;

(c) two gas diffusion electrodes stacked on said electro-catalyst layers, each gas diffusion electrode comprising an electronically conducting, porous material through which reactants and reaction products diffuse in and out of the cell; and

(d) two flow field plates stacked on said gas diffusion electrodes.

9. (Original) A self-moisturizing fuel cell comprising:

(a) a central polymer electrolyte membrane as defined in claim **2** for proton transport, said membrane comprising two opposite primary surfaces;

(b) two electro-catalyst layers on the two opposite sides of the electrolyte membrane in which the chemical reactions occur;

(c) two gas diffusion electrodes stacked on said electro-catalyst layers, each gas diffusion electrode comprising an electronically conducting, porous material through which reactants and reaction products diffuse in and out of the cell; and

(d) two flow field plates stacked on said gas diffusion electrodes.

10.(Original) A self-moisturizing fuel cell comprising:

(a) a central polymer electrolyte membrane as defined in claim **3** for proton transport, said

membrane comprising two opposite primary surfaces;

(b) two electro-catalyst layers on the two opposite sides of the electrolyte membrane in which the chemical reactions occur;

(c) two gas diffusion electrodes stacked on said electro-catalyst layers, each gas diffusion electrode comprising an electronically conducting, porous material through which reactants and reaction products diffuse in and out of the cell; and

(d) two flow field plates stacked on said gas diffusion electrodes.

11. (Original) A self-moisturizing fuel cell comprising:

(a) a central polymer electrolyte membrane as defined in claim **4** for proton transport, said membrane comprising two opposite primary surfaces;

(b) two electro-catalyst layers on the two opposite sides of the electrolyte membrane in which the chemical reactions occur;

(c) two gas diffusion electrodes stacked on said electro-catalyst layers, each gas diffusion electrode comprising an electronically conducting, porous material through which reactants and reaction products diffuse in and out of the cell; and

(d) two flow field plates stacked on said gas diffusion electrodes.

12. (Cancelled).

13. (Cancelled)

14. (Original) A self-humidifying fuel cell comprising:

(a) a central polymer electrolyte membrane layer for proton transport, said membrane having two opposite primary surfaces;

(b) two electro-catalyst layers on the two opposite sides of the polymer electrolyte membrane in which the fuel cell electro-chemical reactions occur;

(c) two gas diffusion electrode layers stacked on said two electro-catalyst layers, each gas diffusion electrode comprising an electronically conducting, porous material through which reactants and reaction products diffuse in and out of the cell; and

(d) two flow field plate layers stacked on said gas diffusion electrodes;

wherein at least one of said membrane layer, electro-catalyst layers, gas diffusion layers, or flow field plate layers comprises a deliquescent material.

15.(Original) The fuel cell as defined in claim **14**, wherein at least two of said layers comprise a deliquescent material.

16.(Original) The fuel cell as defined in claim **14**, wherein said polymer electrolyte membrane comprises a deliquescent material.

17. (Original) The fuel cell as defined in claim **14**, wherein said deliquescent material is selected from the group consisting of zinc chloride, calcium chloride, magnesium chloride, lithium chloride, calcium bromide, potassium biphosphate, sodium formate, potassium acetate, phosphorous oxide, ammonium acetate, sodium acetate, sodium silicate, magnesium acetate, potassium silicate, magnesium sulfate, aluminum oxide, calcium oxide, silicon oxide, zeolite, barium oxide, cobalt chloride, bentonite, montmorillonite clay, silica gel, molecular sieve, monohydric compounds, polyhydric compounds, metal nitrate salt, sodium ethyl-sulfate organic salt, polyethylene glycol, polyvinyl pyrrollidone, and combinations thereof.

18.(Original) The fuel cell as defined in claim **14**, wherein said membrane polymer is selected from the group consisting of poly(perfluoro sulfonic acid), its chemical derivative, its copolymer, its blend with a second polymer, and combinations thereof.

19.(Original) The fuel cell as defined in claim **16**, wherein said deliquescent material is selected from the group consisting of zinc chloride, calcium chloride, magnesium chloride, lithium chloride, calcium bromide, potassium biphosphate, sodium formate, potassium acetate, phosphorous oxide, ammonium acetate, sodium acetate, sodium silicate, magnesium acetate, potassium silicate, magnesium sulfate, aluminum oxide, calcium oxide, silicon oxide, zeolite, barium oxide, cobalt chloride, bentonite, montmorillonite clay, silica gel, molecular sieve, monohydric compounds, polyhydric compounds, metal nitrate salt, sodium ethyl-sulfate organic salt, polyethylene glycol, polyvinyl pyrrollidone, and combinations thereof.

20.(Original) The fuel cell as defined in claim **16**, wherein said membrane polymer is selected from the group consisting of poly(perfluoro sulfonic acid), its chemical derivative, its copolymer, its blend with a second polymer, and combinations thereof.

21-23.(Cancelled)